his failure to notice any of the writings of Joseph Le Conte who certainly was well known to a wide circle of readers in this subject. There was, of course, room for difference of opinion about the validity of results, for Dr. Le Conte's first papers were evoked by what he considered to be mistakes made by Claparède and Helmholtz. Between 1868 and 1882 he published more than a dozen papers on physiological optics in the *American Journal of Science;* and the substance of these was afterward incorporated in a volume on "Sight," which passed through several editions. His acuteness as an observer was generally conceded, and the value of his work was certainly greater than that of some whose work had been done in Germany. He was not a mechanical inventor, and no instruments are ascribed to him. This fact may possibly account for failure to recognize his theoretic work in a book on "Binokularen Instrumente," but in this book there is much interesting reading on theoretic matters.

Since 1890 von Rohr finds a renewal of interest in binocular vision to have set in. For this much credit is due to Dr. Abbe and the school of scientific workers stimulated by him. The binocular microscope had passed out of favor, but between 1880 and 1895 Abbe published a considerable number of papers on binocular microscopes and telescopes, in which he described improvements of such marked value as to compel attention. Since his death the work of development has been continued by his successors, and to-day the Optische Werkstätte at Jena constitute the center from which most of the modern binocular instruments have been issued. Among the most important of these are the Zeiss stereobinocular field glasses with Porro prisms, which are now the standards of excellence in this branch of applied optics.

The third part of von Rohr's book is a systematic arrangement of its contents and a valuable index of the literature of the subject. The care and thoroughness with which this has been prepared is worthy of much praise; indeed it is a model of its kind, and is significant of the dominant standards where optical literature is as completely methodized as mechanical work.

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Washington and Lee University,
July 12, 1909

Intracellular Enzymes—A Course of Lectures Given in the Physiological Laboratory, University of London. By H. M. Vernon, M.A., M.D., Fellow of Magdalen College, and Lecturer on Physiology at Exeter and Queen's Colleges, Oxford. London, John Murray. 1908. Pp. xi + 240. Price 7s. 6d. net.

It is only a few years since Professor Hofmeister expressed the view, in a noteworthy lecture,[1] that sooner or later appropriate, specific enzymes would be discovered to account for each of the manifold vital chemical activities of cells. The recognition of the importance of enzymes in these diverse physiological functions has made it easier to understand how a minute cell can be the seat of such a multiplicity of reactions, and how it is possible for the latter to go on side by side in the living protoplasm. Physiological chemistry has lately witnessed an unusual growth of knowledge in the domain which includes fermentative reactions, particularly those associated with the so-called intracellular or endo-enzymes. The well-known books of Green, Oppenheimer and Effront have been helpful as guides to the literature, but Dr. Vernon's volume is the more welcome because it reviews the newest contributions and presents the subject in a style that is actually readable.

It is, indeed, quite a contrast to turn from the conventional chapter on pepsin and trypsin written a dozen or more years ago, to the pages of Dr. Vernon's lectures, in which the rôle of the newly recognized enzymes in various biological processes is described. Historical perspective and not a little critique characterize the author's descriptions. One becomes acquainted with the bearing of enzymes on nucleoprotein and purine metabolism; with the present status of zymase and lactacidase enzymes; the perplexing problems of so-called

[1] Hofmeister, "Die chemische Organisation der Zelle," Braunschweig, 1901.

oxidases and peroxidases; and the possible interrelations of enzymes and functional capacity. Chapters on the constitution and mode of action of enzymes present numerous newer aspects of study—the identity of rennin and proteolytic enzymes, their adsorption phenomena, the laws of enzyme action, and its reversibility, etc. A final chapter deals with some of the more obscure relations of enzymes to protoplasm and their environment.

Dr. Vernon distinguishes the intracellular enzymes from the exo-enzymes found in many secretions "by reason of the facts that they are bound up in the protoplasm of the cells, and, so long as these cells retain their vitality, can only exert their activity intracellularly." It is perhaps doubtful whether a rigid definition of this sort can be successfully defended. The author at any rate has extended his discussion in places beyond the bounds of strictly intracellular functions; and he has dispelled the fear that "the subject of these lectures might at first sight be regarded as too small and unimportant to warrant their reproduction in book form." They are entertaining as well as helpful. Incidentally, as a specimen of good book-making the volume is in striking contrast to the average American product.

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Plankton Investigations of the Danish Lakes. By C. WESENBERG-LUND. Copenhagen, 1908. Pp. xii + 389. Appendix with forty-six tables.

This is the second volume from the pen of Dr. Wesenberg-Lund dealing with the investigations that have been made at the Danish Freshwater Laboratory. In the first volume, published in 1904, the plankton is treated chiefly from the qualitative and quantitative standpoints. In the present one the origin and variation of the Baltic fresh-water plankton forms are discussed. The variations have been studied by statistical methods in a large amount of material that was collected during a period of ten years.

The author attributes seasonal variations to the increase in the temperature of the water in the spring which lowers its specific gravity and viscosity, thus increasing the rate of sinking of plankton organisms. In response to this change, the organisms increase their buoyancy by adaptations which tend to prevent accelerated sinking. The rate of sinking of an organism depends upon its over-weight, that is, how much heavier it is than the water, its form and relative superficial area, and the viscosity of the water. The first two, over-weight and form-resistance, are the biological factors involved and are conditioned by the organism itself. Buoyancy may be increased by reducing the over-weight, or by increasing the form-resistance. The latter may be increased by enlarging the relative surface through a decrease in volume, by enlarging the absolute surface through an increase in the longitudinal axis or the formation of processes, or by gelatinous coverings. Such adaptations constitute seasonal variations and these are discussed in Chapters II. to XI.

Among the diatoms, it was found that *Tabellaria* and *Asterionella* form chains in the spring but they become stellate in summer. There are variations in the size of the cell, also, which are not seasonal but which seem to have a cycle of four to five years.

In *Ceratium hirundinella* the individuals are comparatively small in April and early May and at this time a fourth horn may be entirely absent or only feebly developed. In late May and in June there is a very considerable increase in size (100μ in length in a month) and a fourth horn suddenly develops. In the latter part of July and in August, the individuals decrease in size and the fourth horn nearly or entirely disappears.

Definite seasonal variations were found in only two rotifers, *Anurœa cochlearis* and *Asplanchna*. The variations begin in May and June and the individuals differ most from the typical, or winter form, when the water reaches its highest temperature. Late in the autumn they return again to their normal appearance.

Dr. Wesenberg-Lund thinks there is ample justification for the reduction of the pond and